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Game Wardens' and Peace Officers' Retirement System of the State of Montana

MPERA
MONTANA PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION

Actuarial Valuation
As of June 30, 2022

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Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

September 26, 2022

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, MT 59620-0139

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Game Wardens' and Peace Officers' Retirement System of the State of Montana (GWPORS), prepared as of June 30, 2022.

The purpose of this report is to provide a summary of the funded status of the System as of June 30, 2022. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the statutory contribution rates are not sufficient to amortize the unfunded accrued liability. The asset values used to determine unfunded liabilities are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in the report cannot be used to assess a settlement of the obligation.

The promised benefits of the System are included in the actuarially calculated contribution rates, which are developed using the Entry Age Normal Cost Method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 3.25% annually. The assumptions recommended by the actuary and adopted by the Board, are in the aggregate, reasonably related to the experience under the Fund and to reasonable expectations of anticipated experience under the Fund.

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

This is to certify that the undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

Todd B. Green

Todd B. Green, ASA, EA, FCA, MAAA
President

Bryan Hoge, FSA, EA, FCA, MAAA
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Senior Actuary

Game Wardens' and Peace Officers' Retirement System of the State of Montana

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Section I: Summary of Results

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below:

VALUATION DATE	**June 30, 2022**	**June 30, 2021**
Participant Counts		
Active Members	977	1,023
Retirees and Beneficiaries	442	418
Disabled Members*	3	2
Terminated Vested Members	170	148
Terminated Non-Vested Members	589	524
Total**	2,181	2,115
Annual Covered Payroll of Active Members	$ 54,286,855	$ 60,022,906
Average Salaries from Covered Payroll	$ 55,565	$ 58,673
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 10,806,388	$ 9,919,682
Assets		
Actuarial value	$ 266,067,351	$ 247,392,056
Market value	260,437,413	273,392,048
Actuarial Accrued Liability (AAL)	$ 320,475,204	$ 290,855,880
Unfunded Actuarial Accrued Liability (UAAL)	$ 54,407,853	$ 43,463,824
Funded Ratio	83.02%	85.06%
Market Value Rate of Return	(4.30%)	27.66%
Annual Cost		
Statutory Funding Rate	19.56%	19.56%
Total Normal Rate	18.50%	15.53%
Employee Contribution Rate	10.56%	10.56%
Employer Normal Rate	7.94%	4.97%
Employer Contribution Rate		
Normal Rate	7.94%	4.97%
Administrative Expense Load	0.00%	0.17%
UAAL Rate	1.06%	3.86%
Total Rate	9.00%	9.00%
Amortization Period	N/A	35 Years
Employer Contribution Rate Necessary to Amortize UAAL over 30 Years		
Normal Rate	7.94%	4.97%
Administrative Expense Load	0.00%	0.17%
UAAL Rate (30-Year Rate)	5.71%	4.15%
Total Rate	13.65%	9.29%
Shortfall/(Surplus)	4.65%	0.29%

* Based on PERB categorization for the annual report. For actuarial purposes, 19 members in 2021 and 18 members in 2022 were valued as disabled members with offsetting reductions to the number of retired members.

** A reconciliation between participant counts used for the annual report and counts for the valuation appears at the beginning of Appendix D.

As a result of this actuarial valuation of the benefits in effect under the Game Wardens' and Peace Officers' Retirement System as of June 30, 2022, the statutory employer contributions are not sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System. The Funded Ratio is 83.02%.

Calculations based on the Market Value of Assets

MCA 19-2-407 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The June 30, 2022, market value of assets is $5,629,938 less than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the statutory contribution would not be sufficient to amortize the unfunded liability. The Funded Ratio would be 81.27%.

Additional Details

MCA 19-8 sets the employer contribution at 9.00% of salary and the employee contribution at 10.56%.

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.

Investment Experience

The market assets earned (4.30)% net of investment and operating expenses. As a result of prior years' unrecognized gains, the actuarial assets earned 8.07%, which is 0.42% greater than the actuarial assumption of 7.65%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Assumed Investment Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2012 to 6/30/2013	12.69%	11.13%	7.75%	4.94%	3.38%
7/1/2013 to 6/30/2014	16.97	12.62	7.75	9.22	4.87
7/1/2014 to 6/30/2015	4.58	9.47	7.75	(3.17)	1.72
7/1/2015 to 6/30/2016	2.11	8.42	7.75	(5.64)	0.67
7/1/2016 to 6/30/2017	11.92	8.15	7.75	4.17	0.40
7/1/2017 to 6/30/2018	8.81	7.01	7.65	1.16	(0.64)
7/1/2018 to 6/30/2019	5.72	7.28	7.65	(1.93)	(0.37)
7/1/2019 to 6/30/2020	2.70	6.99	7.65	(4.95)	(0.66)
7/1/2020 to 6/30/2021	27.66	10.80	7.65	20.01	3.15
7/1/2021 to 6/30/2022	(4.30)	8.07	7.65	(11.95)	0.42

Asset gains or losses result when the return on the actuarial value of assets differs from the actuarial investment return.

Amortization of the UAAL

The statutory contributions are sufficient to amortize the UAAL over a 35-year period at June 30, 2021, and are not sufficient to amortize the UAAL as of June 30, 2022.

Funding and Benefits Policy

The Montana Public Employees' Retirement Board has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

1) Funding Requirement
   a) The Funding and Benefits Policy states:
      1. The Entry Age Normal Cost Method shall be applied to the projected benefits in determining the Normal Cost and Actuarial Accrued Liability.
      2. Asset smoothing can be used in the valuation process to spread the recognition of investment gains and losses over a four-year period.
      3. The unfunded actuarial accrued liability should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis. Generally, the funding period should be constant or decreasing.
   b) Analysis: The liabilities of the System are determined using the Entry Age Normal Cost Method and are compared to the actuarial value of assets, which are developed using assets smoothing that recognizes gains and losses over a four-year period. The contributions provided for in statute are not sufficient to fully amortize the unfunded actuarially accrued liability. Any period over 30 years would exceed the Board's stated Funding Policy.
2) Funding Objectives
   a) The Funding and Benefits Policy states: "The primary objectives are to: 1) ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income; and 2) achieve a well-funded status with a range of safety to absorb market volatility without creating a UAAL."
   b) Analysis: The contributions provided for in statute are not sufficient to fully amortize the unfunded actuarially accrued liability within 30 years. Absent significant investment return, the System is in danger of not ensuring the System will remain financially sound and is risking the ability to pay all benefits promised in the future. In addition, the System is putting at risk the ability to achieve a well-funded status with a range of safety to absorb market volatility without creating additional UAAL.
3) Benefit Enhancements
   a) The Funding and Benefits Policy states: "Proposals must provide funding from sources sufficient to cover future costs. Unfunded liabilities created by the proposal must be amortized over a period of time appropriate to the retirement system, but not more than 30 years."
   b) Analysis: Without the supplemental funding, a benefit enhancement would increase the amortization period of the unfunded actuarial accrued liability and further delay the goal of achieving a well-funded status with a range of safety to absorb market volatility without creating a UAAL.

State Debt

Under HB 553, passed during the 2019 Legislative Session, the amount of pension system debt that amortizes over 30 years is to be included in the definition of "state debt". The funding period for the current valuation is infinite, so a state debt amount must be disclosed. Assuming a one-time payment is made on January 1, 2023, the state debt is $46.0 million. Based on the current valuation, this payment would reduce the funding period to 30 years.

Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.0% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	83.02%	Does not amortize	$7.4
Higher Assumption 8.30%	94.72%	8 Years	1.9
Increase / (Decrease)	11.70%	N/A	($5.5)

Impact of Assuming 0.5% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	83.02%	Does not amortize	$7.4
Higher Assumption 7.80%	88.78%	63 Years	5.8
Increase / (Decrease)	5.76%	N/A	($1.6)

Impact of Assuming 0.5% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	83.02%	Does not amortize	$7.4
Lower Assumption 6.80%	77.46%	Does not amortize	13.8
Increase / (Decrease)	(5.56%)	N/A	$6.4

Impact of Assuming 1.0% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	83.02%	Does not amortize	$7.4
Lower Assumption 6.30%	72.10%	Does not amortize	17.3
Increase / (Decrease)	(10.92%)	N/A	$9.9

* Amounts reflect estimated increase/(decrease) in FY2022 employer contributions only, in order to maintain a 30 year amortization period.

The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four-year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities, but will not change the actual experience. The amortization period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 years each year, reflecting gains and losses due to experience different than the actuarial assumptions.

Assumption Changes

Since the June 30, 2021 valuation, the Montana Public Employee Retirement Administration (MPERA) adopted the recommendations made in the experience study for the five-year period ending June 30, 2021. The assumption changes outlined below are effective July 1, 2022:

- Lowered the investment return assumption from 7.65% to 7.30%.
- Updated all mortality tables to the PUB2010 tables for public safety employees.
- Updated the rates of withdrawal, retirement, disability, and salary merit scale.
- Lowered the payroll growth assumption from 3.50% to 3.25%.

Benefit Changes

There have been no benefit changes since the previous valuation.

Contribution Changes

There have been no contribution changes since the previous valuation.

Method Changes

There have been no method changes since the previous valuation.

Impact of Changes

The following table summarizes how experience has changed the UAAL since the June 30, 2021 Actuarial Valuation. Further detail can be found in Table 10.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

June 30, 2021 Valuation UAAL	$43,463,824
Normal Cost (Including Expenses)	8,561,375
Contributions	(11,015,748)
Interest	3,558,576
Expected June 30, 2022 UAAL	44,568,027
Experience (Gain)/Loss on Actuarial Liabilities	($10,036,018)
Experience (Gain)/Loss on Actuarial Assets	(1,031,424)
Assumption & Method Changes	20,907,268
Plan Changes	0
Total (Gain) / Loss	9,839,826
June 30, 2022 Valuation UAAL	54,407,853

Summary

* The System's actuarial value investment return of 8.07% for the year ended June 30, 2022, is 0.42% greater than the actuarial assumption of 7.65%. This represents an asset gain of $1,031,424 due to investment return being more than anticipated. As of June 30, 2022, the market value of assets was $260,437,413. As of June 30, 2022, the actuarial value of assets was $266,067,351. The June 30, 2022, market value of assets will be recognized in future actuarial valuations unless it is offset by returns greater than the 7.30% assumption.

* As of June 30, 2022, the contribution amount allocated towards amortizing the UAAL is insufficient to paying off the principal balance. The ultimate goal of the Board's Funding and Benefits Policy is to increase the funded status to a level such that the amortization period is below 30. Absent of significant good investment experience this goal cannot be achieved without increasing employer contributions, member contributions or a combination of the two.

* The funding of the retirement system will be impacted by future experience, which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.30% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that allows gains and losses to be smoothed over four years.

  The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. Under the level percentage of payroll method, amortization payments will not be large enough to cover interest on the UAAL in the beginning of the amortization schedule, which means that as a dollar amount the UAAL is expected to grow. After a period of time, amortization payments will be large enough that the amortization payments will cover both interest and principal, and the UAAL as a dollar amount will be projected to decrease in each subsequent year. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the unfunded liability. The payroll growth assumption is 3.25%.

Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2022. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 10 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption. Table 5 summarizes the historical asset values on a market value and actuarial value basis, to the extent it was available. Additional data can be included in this table for future reports, if provided by the System.

Table 1:
Statement of Fiduciary Net Position
Fiscal Year Ending June 30,

	2022	2021
ASSETS		
Cash and Short Term Investments	$ 3,092,936	$ 3,555,337
Securities Lending Collateral	$ 2,660,955	$ 1,561,783
Receivables:		
Interest Receivable	$ 2,911	$ 245
Accounts Receivable	73,429	32,245
Due from Other Funds	-	-
Due from Primary Government	-	-
Notes Receivable	-	-
Total Receivables	$ 76,340	$ 32,490
Investments, at fair value:		
Investment Pools	257,188,294	269,697,879
Other Investments	-	-
Total Investments	$ 257,188,294	$ 269,697,879
Capital Assets		
Property and Equipment, at cost, net of Accumulated Depreciation	$ 366	$ 366
Intangible Assets, at cost, net of Amortization Expense	271,297	248,436
Total Capital Assets	$ 271,663	$ 248,802
TOTAL ASSETS	$ 263,290,188	$ 275,096,291
LIABILITIES		
Securities Lending Liability	$ 2,660,955	$ 1,561,782
Accounts Payable	71,538	24,822
Unearned Revenue	80	1,508
Due to Other Funds	120,202	116,131
Compensated Absences	-	-
OPEB Implicit Rate Subsidy LT	-	-
TOTAL LIABILITIES	$ 2,852,775	$ 1,704,243
NET POSITION-RESTRICTED FOR PENSION BENEFITS	$ 260,437,413	$ 273,392,048

Table 2:
Statement of Changes in Fiduciary Net Position
Fiscal Year Ending June 30,

	2022	2021
ADDITIONS		
Contributions:		
Employer	$ 4,940,955	$ 5,411,275
Plan Member	6,074,793	6,392,898
Other	-	-
Total Contributions	$ 11,015,748	$ 11,804,173
Misc Income	$ -	$ -
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	$ (9,899,412)	$ 60,625,368
Investment Earnings	11,516	6,950
Security Lending Income	27,506	18,580
Investment Income/(Loss)	$ (9,860,390)	$ 60,650,898
Investment Expense	(1,853,797)	(1,519,363)
Security Lending Expense	(6,043)	(3,647)
Net Investment Income/(Loss)	$ (11,720,230)	$ 59,127,888
Total Additions	$ (704,482)	$ 70,932,061
DEDUCTIONS		
Benefit Payments	$ 10,587,005	$ 9,282,705
Refunds/Distributions	1,463,999	870,457
Refunds to Other Plans	30,269	16,918
Transfers to DCRP	-	-
Transfers to MUS-RP	-	-
OPEB Expense	-	-
Administrative Expense	168,880	234,188
Total Deductions	$ 12,250,153	$ 10,404,268
NET INCREASE (DECREASE) IN PLAN NET ASSETS	$ (12,954,635)	$ 60,527,793
NET POSITION-RESTRICTED FOR PENSION BENEFITS BEGINNING OF YEAR	$ 273,392,048	$ 212,910,191
ADJUSTMENT	-	(45,936)
END OF YEAR	$ 260,437,413	$ 273,392,048

Table 3:
Determination of Actuarial Value of Assets

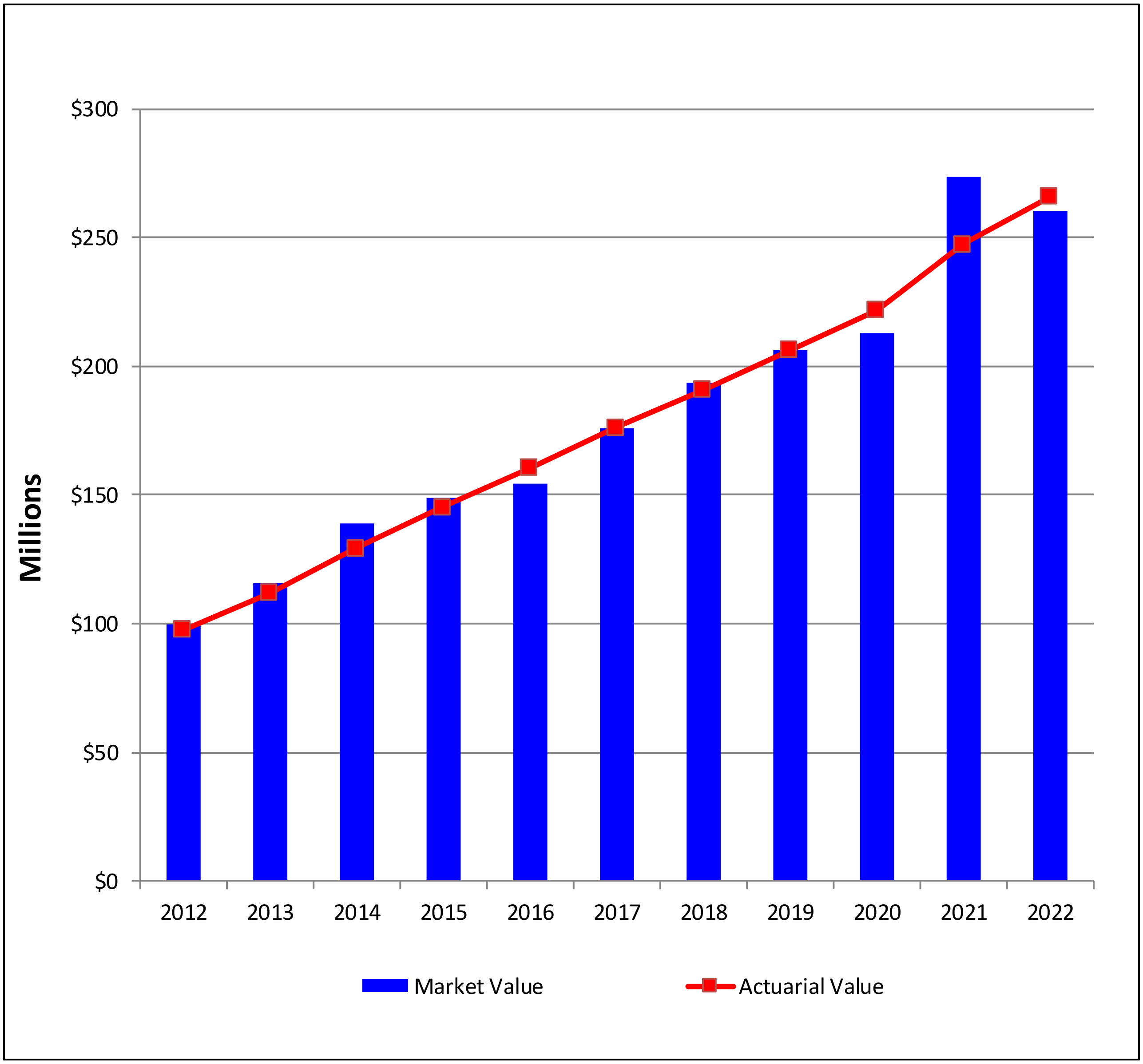
Valuation Date June 30:	2021	2022	2023	2024	2025
A. Actuarial Value Beginning of Year	$ 221,948,510	$ 247,392,056			
B. Market Value End of Year	273,392,048	260,437,413			
C. Market Value of Beginning of Year	212,910,191	273,392,048			
D. Cash Flow					
D1. Contributions	11,804,173	11,015,748			
D2. Benefit Payments	(10,170,080)	(12,081,273)			
D3. Administrative Expenses	(234,188)	(168,880)			
D4. Investment Expenses	(1,523,010)	(1,859,840)			
D5. Net	$ (123,105)	$ (3,094,245)			
E. Investment Income					
E1. Market Total: B. - C. - D5.	$ 60,604,962	$ (9,860,390)			
E2. Assumed Rate	7.65%	7.65%			
E3. Amount for Immediate Recognition C*E2. + ((D1. + D2. + D3.)*E2.*0.5) - D4.	17,864,186	22,727,116			
E4. Amount for Phased-in Recognition E1. - E3.	42,740,776	(32,587,506)			
F. Phased-in Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	$ 10,685,194	$ (8,146,877)	$ -	$ -	$ -
F2. First Prior Year	(2,559,694)	10,685,194	(8,146,877)	-	-
F3. Second Prior Year	(936,199)	(2,559,694)	10,685,194	(8,146,877)	-
F4. Third Prior Year	513,164	(936,199)	(2,559,694)	10,685,194	(8,146,877)
F5. Total Excluded Investment Gain/(Loss)	$ 7,702,465	$ (957,576)	$ (21,377)	$ 2,538,317	$ (8,146,877)
G. Actuarial Value End of Year A. + D5. + E3. + F5.	$ 247,392,056	$ 266,067,351			

Table 4:
Historical Investment Returns*

Fiscal Year Ending	Market Returns	Actuarial Returns	Assumed Rate of Return	Actuarial Return Over Assumption
June 30, 2013	12.69%	11.13%	7.75%	3.38%
June 30, 2014	16.97%	12.62%	7.75%	4.87%
June 30, 2015	4.58%	9.47%	7.75%	1.72%
June 30, 2016	2.11%	8.42%	7.75%	0.67%
June 30, 2017	11.92%	8.15%	7.75%	0.40%
June 30, 2018	8.81%	7.01%	7.65%	(0.64)%
June 30, 2019	5.72%	7.28%	7.65%	(0.37)%
June 30, 2020	2.70%	6.99%	7.65%	(0.66)%
June 30, 2021	27.66%	10.80%	7.65%	3.15%
June 30, 2022	(4.30)%	8.07%	7.65%	0.42%
10 Year Average	8.56%	8.98%		1.28%

* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.

Table 5:
Market Value of Assets vs. Actuarial Value of Assets



Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 6 contains an analysis of the actuarial present value for active members, for retirees, and for beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 6 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.

Table 6:
Actuarial Present Value of for Actives, Retirees, and Beneficiaries

	June 30, 2022 Total	June 30, 2021 Total
A. Active Members Liability Due to Probability of		
Retirement	$ 184,075,698	$ 171,167,194
Disability	$ 6,710,911	$ 7,578,954
In-Service Death	$ 2,251,141	$ 4,083,397
Termination	$ 23,842,249	$ 20,118,185
Total	$ 216,879,999	$ 202,947,730
B. Inactive Members and Annuitants		
Service Retirement	$ 135,862,518	$ 120,318,056
Disability Retirement	$ 6,288,557	$ 5,402,225
Beneficiaries*	$ 5,979,840	$ 6,011,255
Vested Terminated Members	$ 18,550,481	$ 14,302,639
Refund of Member Contributions	$ 2,584,478	$ 1,912,542
Total	$ 169,265,874	$ 147,946,717
C. Grand Total	$ 386,145,873	$ 350,894,447

* Includes survivors of active and retired members.

Employer Contributions

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 6 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation sets a schedule of future contributions that will deal with this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between two elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;

- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.30%, net of investment and administrative expenses.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 7. In Table 7 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.

Table 8 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. The future normal cost contributions are the portion of the present value of future benefits that are attributed to future years of service that have not been earned yet by the active membership. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.

Table 7:
Normal Cost Contribution Rates
As Percentages of Salary

	June 30, 2022 Total	June 30, 2021 Total
Service retirements	11.65%	9.99%
Disability retirements	0.95%	0.86%
In Service Death	0.24%	0.38%
Terminations	5.66%	4.30%
Total Normal Rate	18.50%	15.53%
Employee Normal Rate	10.56%	10.56%
Employer Normal Rate	7.94%	4.97%
Administrative Expense Load	0.00%	0.17%
Rate Available to Amortize Unfunded Actuarial Accrued Liability	1.06%	3.86%
Statutory Funding Rate	19.56%	19.56%

Note: The normal cost rate for members hired on or after July 1, 2011 is 17.15%.

Table 8:
Unfunded Actuarial Accrued Liability

	June 30, 2022	June 30, 2021
A. Actuarial present value of all future benefits for present members and former members and their survivors (Table 6)	$ 386,145,873	$350,894,447
B. Less actuarial present value of total future normal costs for present members	$ 65,670,669	$ 60,038,567
C. Actuarial accrued liability	$ 320,475,204	$290,855,880
D. Less assets available for benefits	$ 266,067,351	$247,392,056
E. Unfunded actuarial accrued liability	$ 54,407,853	$ 43,463,824

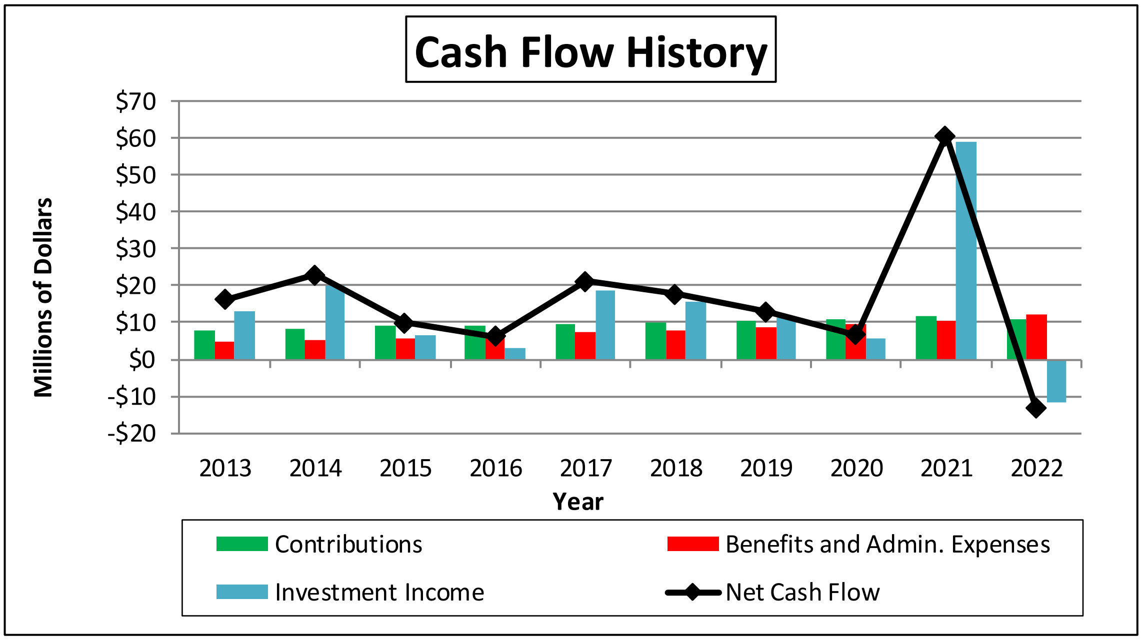
Cash Flows

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a “negative cash flow.” Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system’s investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

Table 9 shows the System had a positive cash flow for the year ended June 30, 2022. The System’s total cash flow including benefit payments, administrative expenses and investment earnings was $(13.0) million. Of the $(13.0) million, $(11.7) million was due to investment returns.

As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions.

Table 9:
Cash Flow History
(Dollar amounts in millions)



Year Ended June 30	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
	Historical Cash Flows			
2013	$7.8	$4.7	$13.1	$16.2
2014	8.2	5.4	20.1	22.9
2015	9.0	5.6	6.4	9.8
2016	9.3	6.4	3.2	6.1
2017	9.7	7.2	18.7	21.2
2018	10.1	8.0	15.6	17.7
2019	10.3	8.6	11.1	12.8
2020	10.7	9.7	5.6	6.6
2021	11.8	10.4	59.1	60.5
2022	11.0	12.3	(11.7)	(13.0)

Actuarial Gains or Losses

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The developments of the gains or losses related to the actuarial liability and the assets are shown in Table 10. The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 11. Each gain or loss shown represents our estimate of how much the given type of experience caused the Unfunded Actuarial Accrued Liability or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic experience studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.

Table 10:
Analysis of Actuarial (Gains) or Losses*

A. ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS

1. Actual Actuarial Accrued Liability as of June 30, 2021:	$ 290,855,880
2. Normal Cost for this Plan Year (Including Expenses):	8,561,375
3. Interest on items 1 and 2 [(1+2) x 7.65%]:	22,905,420
4. Benefit Payments for this Plan Year (Including Expenses):	(12,250,153)
5. Interest on item [4 x 7.65% x .5]:	(468,568)
6. Expected Actuarial Accrued Liability as of June 30, 2022:	309,603,954
7. Changes due to:	
a. Assumption Changes:	20,907,268
b. Plan Amendments:	-
c. Funding Method:	-
d. Actuarial (Gain) / Loss:	$ (10,036,018)
8. Actual Actuarial Accrued Liability as of June 30, 2022:	**$ 320,475,204**

9. Items Affecting Calculation of Unfunded Accrued Actuarial Liability:

   a. Benefit provisions reflected in the unfunded accrued liability (see Appendix C)
   b. Actuarial assumptions and methods used to determine actuarial accrued liability (see Appendix B)

B. ASSET (GAIN) / LOSS ANALYSIS

1. Actuarial Value of Assets as of June 30, 2021:	$ 247,392,056
2. Interest on item [1 x 7.65%]:	18,925,492
3. Contributions for this Plan Year:	11,015,748
4. Interest on item [3. x 7.65% x .5]:	421,352
5. Benefit Payments for this Plan Year (Including Expenses):	(12,250,153)
6. Interest on item [5. x 7.65% x .5]:	(468,568)
7. Expected Actuarial Value of Assets as of June 30, 2022:	$ 265,035,927
8. Actuarial Value of Assets as of June 30, 2022:	$ 266,067,351
9. (Gain) / Loss	**$ (1,031,424)**

C. UNFUNDED ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS

1. Actual Unfunded Actuarial Accrued Liability as of June 30, 2021:	$ 43,463,824
2. Normal Cost for this Plan Year (Including Expenses):	8,561,375
3. Contributions for this Plan Year:	(11,015,748)
4. Interest on items 1 - 3: [(1+2) x 7.65% + (3 x 7.65% x .5)]:	3,558,576
5. Expected Unfunded Actuarial Accrued Liability as of June 30, 2022:	$ 44,568,027
6. Changes due to:	
a. Assumption Changes:	20,907,268
b. Plan Amendments:	-
c. Funding Method:	-
d. Actuarial (Gain) / Loss:	$ (11,067,442)
7. Actual Unfunded Actuarial Accrued Liability as of June 30, 2022:	**$ 54,407,853**

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

Table 11:
Historical Actuarial (Gains) or Losses*
(Dollar amounts in thousands)

	UAAL (Gain)/Loss		
	June 30, 2022	**June 30, 2021**	**June 30, 2020**
Investment Income			
Investment income was (greater) less than expected based on actuarial value of assets.	$ (1,031.4)	$ (7,011.0)	$ $ 1,369.3
Pay Increases			
Pay increases were (less) greater than expected.	$ (9,294.3)	$ 8,653.0	$ 1,474.1
Age & Service Retirements			
Members retired at (older) younger ages or with (less) greater final average pay than expected	$ 49.7	$ 1,838.3	$ 284.0
Disability Retirements			
Disability claims were (less) greater than expected	$ (102.0)	$ (225.1)	$ (216.8)
Death-in-Service Benefits			
Survivor claims were (less) greater than expected	$ (88.6)	$ (26.5)	$ (216.6)
Withdrawal From Employment			
(More) less reserves were released by withdrawals than expected	$ (2,027.8)	$ (554.2)	$ 1,192.4
Death After Retirement			
Retirees (died younger) lived longer than expected	$ (673.0)	$ (216.5)	$ (1,670.4)
Data Adjustments and Benefit Payment Timing			
Service purchases, data corrections, etc.	$ 2,106.5	$ (1,184.3)	$ 1,800.3
Other			
Miscellaneous (gains) and losses	$ (6.5)	$ (4.4)	$ (9.2)
Total (Gain) or Loss During Period From Financial Experience	$ (11,067.4)	$ 1,269.3	$ 4,007.1
Non-Recurring Items.			
Changes in actuarial assumptions and methods	$ 20,907.3	$ -	$ -
Changes in benefits caused a (gain) loss	$ -	$ -	$ -
Composite (Gain) Loss During Period	$ 9,839.9	$ 1,269.3	$ 4,007.1

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become "pay as you go". The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. The System is primarily funded by member and employer contributions to the trust fund, together with the earnings on these accumulated contributions. These contributions fund benefit accruals for current active members and administrative expenses. The remainder of the contributions amortizes the unfunded actuarial accrued liability. The contribution rates are set by state statute and intended to provide the needed amounts to fund the system over time. The purpose of the valuation is to determine if the fixed contributions are sufficient to fund the System. Due to the fixed nature of the contributions actuarial gains and losses are reflected in the amortization period. Generally, the largest source of actuarial gains and losses are caused by investment volatility. In addition, the unfunded liability is amortized as a level percentage of pay assuming payroll will grow by 3.25% per year. A key risk factor to the System's funding is that over time, the Statutory Contribution Rates will be insufficient to accumulate enough funds, with investment income, to fund the promised benefits. The funding insufficiency can be caused by amortization periods that are too long or by payroll not growing at the assumed rate.

The other significant risk factor for the System is investment return because of the volatility of returns and the size of plan assets compared to payroll. This is to be expected, given the underlying capital market assumptions and the System's asset allocation. To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results. Please see the summary of results of this report which demonstrates the sensitivity of valuation results to differing discount rates.

A key demographic risk for the Retirement System is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect a margin for improvement in mortality experience these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, which would also be significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The exhibits on the following pages summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.

Historical Asset Volatility Ratios
(in 1,000's)

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Plan Year Payroll	Asset Volatility Ratio
6/30/2015	$ 148,638	$ 44,713	3.32
6/30/2016	154,685	47,108	3.28
6/30/2017	175,841	49,381	3.56
6/30/2018	193,523	50,823	3.81
6/30/2019	206,347	51,677	3.99
6/30/2020	212,910	53,825	3.96
6/30/2021	273,392	60,023	4.55
6/30/2022	260,437	54,287	4.80

The assets at June 30, 2022 are 480% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 6.30% for one year) is equivalent to 4.80% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the risk associated with volatile investment returns.

Historical Cash Flows
(in 1,000's)

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments and administrative expenses. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. The System currently has positive cash flow. It appears that the System's net cash flow is trending from positive to negative. While there are no immediate concerns, this should be continued to be monitored going forward.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/2015	$ 148,638	$ 9,012	$ 5,553	$ 3,459	2.33%
6/30/2016	154,685	9,314	6,431	2,883	1.86%
6/30/2017	175,841	9,742	7,175	2,567	1.46%
6/30/2018	193,523	10,125	8,028	2,097	1.08%
6/30/2019	206,347	10,252	8,552	1,700	0.82%
6/30/2020	212,910	10,672	9,693	979	0.46%
6/30/2021	273,392	11,804	10,404	1,400	0.51%
6/30/2022	260,437	11,016	12,250	(1,234)	(0.47%)

Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. Retiree liability as a percentage of the total actuarial accrued liability has been growing over the last five years. As more of the total liability begins to reside with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs. Below are two tables which demonstrate the ratio of the System's retiree liability compared to the total accrued liability and the ratio of the number of retirees and beneficiaries to the number of active members.

Year End	Retiree Liability (a)	Total Actuarial Accrued Liability (b)	Retiree Percentage (a) / (b)
6/30/2015	$67,112,776	$172,159,908	39.0%
6/30/2016	77,744,132	191,007,338	40.7%
6/30/2017	90,203,382	217,642,368	41.4%
6/30/2018	101,651,278	230,077,307	44.2%
6/30/2019	115,460,624	245,129,744	47.1%
6/30/2020	129,547,563	264,744,609	48.9%
6/30/2021	147,946,717	290,855,880	50.9%
6/30/2022	169,265,874	320,475,204	52.8%

Historical Member Statistics

Valuation Date June 30,	Number of Active	Number of Retired	Active/ Retired
2015	993	231	4.30
2016	989	250	3.96
2017	1,012	276	3.67
2018	1,010	312	3.24
2019	1,021	346	2.95
2020	1,033	384	2.69
2021	1,023	420	2.44
2022	977	445	2.20

The assumptions and methods utilized in the valuation were developed in the five-year experience study for the period ending June 30, 2021.

Tables B-3 through B-5 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is defined to equal the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates, and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data has been supplied by the System and was accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Administrative and Investment Expenses

The administrative and investment expenses of the System are assumed to be funded by investment earnings in excess of 7.30% per year.

Valuation of Assets

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Investment Earnings
The annual rate of investment earnings of the assets of the System is assumed to be 7.30% per year net of administrative and investment expenses, compounded annually.

Interest on Member Contributions
Interest on member contributions is assumed to accrue at the most recent actual rate granted, or a rate of 0.22% per annum, compounded annually.

Future Salaries
The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table B-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 3.50% annual rate of increase in the general wage level of the membership.

Service Retirement
Table B-3 shows the annual assumed rates of retirement for actives members meeting the service retirement eligibilities.

Disablement
The rates of disablement used in this valuation are illustrated in Table B-4.

Mortality
The mortality rates used in this valuation are described in Table B-1. 10% of all member deaths are assumed to be duty-related.

Other Terminations of Employment
The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table B-5.

Probability of Marriage & Dependent Children
If death occurs in active status, all members are assumed to have an eligible surviving spouse with no dependent children.

Records with no Birth Date
New records with no birth date are assumed to be 37 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.

Active Records with a Salary Less than $1,000
These members are included in the active headcounts, however the pay of these members is not included in the Valuation Projected Salaries summarized in Appendix D. The liability for these members is their accumulated member contributions payable on the valuation date.

Table B-1

Summary of Valuation Assumptions

I.	**Economic assumptions**	
A.	General wage increases	3.50%
B.	Investment return	7.30%
C.	Price inflation assumption	2.75%
D.	Payroll growth	3.25%
E.	Growth in membership	0.00%
F.	Interest on member accounts	0.22%
II.	**Demographic assumptions**	
A.	Individual salary increase due to promotion and longevity	Table B-2
B.	Retirement	Table B-3
C.	Disablement	Table B-4
D.	Mortality among contributing members For Males and Females: PUB 2010 Safety Amount Weighted Employee Mortality Table projected to 2021. Projected generationally using MP-2021.	
E.	Mortality among service retired members For Males and Females: PUB 2010 Safety Amount Weighted Healthy Retiree Mortality Table projected to 2021, set forward one year for males, adjusted 105% for males and 100% for females. Projected generationally using MP-2021.	
F.	Mortality among beneficiaries For Males and Females: PUB 2010 Safety Amount Weighted Contingent Survivor Mortality Table projected to 2021, set forward one year for males. Projected generationally using MP-2021.	
G.	Mortality among disabled members For Males and Females: PUB 2010 Safety Amount Weighted Disabled Retiree Mortality Table projected to 2021, set forward one year for males.	
H.	Other terminations of employment	Table B-5

Table B-2

Future Salaries

Years of Service	(a) Individual Merit & Longevity	(b) General Wage Increase	(1+(a))*(1+(b)) Total Salary Increase
0-1	6.40%	3.50%	10.12%
1-2	4.70	3.50	8.36
2-3	3.60	3.50	7.23
3-4	2.70	3.50	6.29
4-5	2.00	3.50	5.57
5-6	1.40	3.50	4.95
6 & Up	1.00	3.50	4.54

Table B-3

Retirement
Annual Rates

Age	Age 55 with 5 Years of Service	Age 50 with 20 Years of Service
Less than 50	N/A	0%
50	N/A	15.0
51	N/A	15.0
52	N/A	15.0
53	N/A	15.0
54	N/A	15.0
55	15.0	18.0
56	5.0	18.0
57	5.0	18.0
58	5.0	18.0
59	5.0	18.0
60	15.0	18.0
61	15.0	41.0
62	40.0	50.0
63	15.0	35.0
64	15.0	20.0
65 & Over	100.0	100.0

Table B-4

Disablement
Annual Rates

Age	All Members
22	0.00%
27	0.11
32	0.11
37	0.11
42	0.37
47	0.37
52	0.37
57	0.36
62	0.00

75% of disabilities are assumed to be duty-related. All disabilities are assumed to be permanent and without recovery.

Table B-5

Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates

Years of Service	All Members
0	30.00%
1	23.00
2	17.00
3	13.00
4	13.00
5	9.25
6	8.75
7	8.75
8	8.75
9	8.75
10	7.75
11	5.00
12	5.00
13	4.00
14 & Over	3.00

Family Composition
100% of active members are assumed to be married. Female spouses are assumed to be three years younger than males. Actual marital characteristics are used for pensioners.

Vested Benefits for Termination Members
Vested benefits for members who terminated during years ending June 30, 2009 and later were estimated based upon compensation and service information in the census data. For members who terminated prior to June 30, 2008, vested benefits valued were the same as had been calculated by the prior actuary for the June 30, 2008 actuarial valuation.

Service credit	• Service credit is used to determine the amount of a member's retirement benefit. • One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service.
Membership service	• Membership service is used to determine eligibility for vesting, retirement or other benefits. • One month of membership service is earned for any month member contributions are made, regardless of the number of hours worked. • Eligible members in all systems may purchase service that counts toward membership service. • Additionally, eligible active and inactive Sheriffs' Retirement System (SRS) members may purchase 1 for 5 (additional) service that will count as membership service.
Contributions	• Member contributions are made through an "employer pick-up" arrangement which results in deferral of taxes on the contributions.
Compensation	• Compensation generally means all remuneration paid, excluding certain allowances, benefits, and lump sum payments. Compensation is specifically defined in law and differs amongst the systems. • Bonuses paid **on or after** July 1, 2013 to any member will not be treated as compensation for retirement purposes. No member or employer contributions will be paid on bonuses.
Withdrawal of employee contributions	• A member is eligible for a withdrawal of their contributions when they terminate service and are either not eligible for or have not taken a retirement benefit. • The member receives the accumulated member contributions, which consists of member contributions and regular interest. • Upon receipt of a refund of accumulated contributions a member's vested right to a monthly benefit is forfeited.
Member contributions interest credited (regular interest)	• Interest is credited to member accounts at the rates determined by the Board. • The current interest rate credited to member accounts is 0.22%.

Working Retiree Limitations	Applies to retirement system members who return **on or after** July 1, 2017 to covered employment in the system from which they retired. These limits already applied to SRS members before July 1, 2017.
	• Members who return for **less than 480 hours** in a **calendar** year:
	  ○ may not become an active member in the system; and
	  ○ are subject to a $1 reduction in their retirement benefit for each $3 earned in excess of $5,000 in the calendar year.

- Members who return for **480 or more hours** in a **calendar** year;
  - must become an active member of the system;
  - will stop receiving a retirement benefit from the system; **and**
  - will be eligible for a second retirement benefit if they earn 5 or more years of service credit through their second employment.
- Employee, employer and state contributions apply as follows:
  - Employer contributions and state contributions (if any) must be paid on all working retirees;
  - Employee contributions must be paid on working retirees who return to covered employment for 480 or more hours in a calendar year.

NOTE: PERS has its own limits.

Second Retirement Benefit -

Applies to retirement system members who return on or after July 1, 2017 to active service covered by the system from which they retired.

- If the member works more than 480 hours in a calendar year and accumulates less than 5 years of service credit before terminating again, the member:
  - is not awarded service credit for the period of reemployment;
  - is refunded the accumulated contributions associated with the period of reemployment;
  - starting the first month following termination of service, receives the same retirement benefit previously paid to the member; and
  - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA in January immediately following second retirement.
- If the member works more than 480 hours in a calendar year and accumulates at least 5 years of service credit before terminating again, the member:
  - is awarded service credit for the period of reemployment;
  - starting the first month following termination of service, receives:
    - the same retirement benefit previously paid to the member; **and**
    - a second retirement benefit for the period of reemployment calculated based on the laws in effect as of the member's rehire date; **and**
  - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA:
    - on the initial retirement benefit in January immediately following second retirement; **and**

	* on the second retirement benefit starting in January after receiving that benefit for at least 12 months. • A member who returns to covered service is **not** eligible for a disability benefit.
Refunds	• Terminating members eligible to retire may, in lieu of receiving a monthly retirement benefit, refund their accumulated contributions in a lump sum. • Terminating members with accumulated contributions between $200 and $1,000 who wish to rollover their refund must do so within 90 days of termination of service. • Trusts, estates, and charitable organizations listed as beneficiaries are entitled to receive only a lump sum payment.
Lump-sum payouts	• Effective July 1, 2017, lump sum payouts in all systems are limited to the member's accumulated contributions rather than the present value of the member's benefit.
Type of plan	• Multiple-employer cost sharing
Membership eligibility	• Game wardens • Warden supervisor • State peace officers
Member contributions	• 10.56% of member's compensation
Employer contributions	• 9.0% of each member's compensation
Compensation period used in benefit calculation	• HAC = Highest Average Compensation • Hired **prior to** July 1, 2011: HAC is average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to member. • Hired **on or after** July 1, 2011: HAC is average of the highest 60 consecutive months (or shorter period of total service) of compensation paid to member. • Hired **on or after** July 1, 2013: 110% annual cap on compensation considered as part of a member's HAC.
Service retirement eligibility and benefit formula	• Age 50 with 20 years of membership service • 2.5% of HAC x years of service credit
Early retirement eligibility and benefit	• Age 55 with 5 years of membership service • A reduced retirement benefit calculated using the HAC and service credit at early retirement.

Disability retirement eligibility and benefit formula

Duty-related disability:

- Vested active member
- 5 years of membership service
- **Less than 20 years** of membership:
  50% or HAC, or
- **20 years or more** of membership service:
  2.5% of HAC x years of service credit

Regular disability:

- Vested member
- The actuarial equivalent of the accrued normal retirement benefit at the time of disability.

Survivor's eligibility and benefit formula

Duty-related deaths: **(active member)**, a monthly survivor benefit to the designated beneficiary equal to:

- **25 years or less** of membership service:
  50% of HAC, or
- **More than 25 years** of membership service:
  2.5% of HAC x years of service credit.

Non-duty-related deaths:

- Active or inactive member
- Lump-sum refund of the member's accumulated contributions; **or**
- Actuarial equivalent of the service benefit.

- Effective July 1, 2017, beneficiaries of GWPORS members who die prior to retirement are eligible for either a lump-sum benefit or a monthly survivor benefit. The monthly survivor benefit may be paid out as an option 1, 2, 3 or 4, at the survivor's discretion. Previously, statute provided for lump-sum payments only.

Vested eligibility and benefit

- 5 years of membership service
- Accrued normal retirement benefit, payable when eligible for retirement.
- In lieu of a pension, a member may receive a refund of accumulated contributions.
- Upon receipt of a refund of accumulated contributions, a member's vested right to a monthly benefit is forfeited.

Retirement benefits - Form of payment	• Option 1, the normal form of payment is a single life annuity with a refund of any remaining accumulated contributions (account balance) to a designated beneficiary.
	• Optional Benefits:
	  • Option 2, a life annuity and joint 100% survivor benefit,
	  • Option 3, a life annuity and joint 50 % survivor benefit, and
	  • Option 4, a life annuity with a period certain.
	• If a retiring member selects Option 2 or 3 and the contingent annuitant predeceases or is divorced from the member, the retiree may, within 18 months of the death or divorce, choose to revert to the higher Option 1 benefit available at retirement or the retiree may select a different contingent annuitant and/or a different option.

Post retirement benefit increases	For retired members who have been retired at least 12 months, a Guaranteed Annual Benefit Adjustment (GABA) will be made each year in January equal to:
	  • 3% for members hired **before** July 1, 2007, and
	  • 1.5% for members hired **on or after** July 1, 2007

Changes since last valuation	• None

Valuation Data

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Board Summary (page 1) match the ACFR at the request of the Board. The differences between counts, if any, have no material effect upon the liability calculation.

	Active	Disabled	Retirees and Beneficiaries	Terminated Vested Members	Terminated Non-Vested Members	Total
Participant Counts Used for Valuation	977	21	424	169	588	2,179
Disabled Members having attained normal retirement age		(18)	18			
Beneficiaries of Disabled Members						
Beneficiaries with less than one year of certain payments remaining						
Other Adjustments				1	1	2
Participant Counts shown in the Annual Financial Report	977	3	442	170	589	2,181

This valuation is based upon the membership of the System as of June 30, 2022. Membership data were supplied by the System and has been accepted for valuation purposes without audit. However, tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

The salaries used in the tables and charts which follow are different than the salaries used for the Summary of Results on page 1. The valuation salaries are anticipated to be paid for the following fiscal year, whereas the Summary of Results salaries are applicable in the year ending on the valuation date.

Active Members	Number	Valuation Projected Salaries
Full-Time Members	881	$ 52,564,444
Part-Time Members	96	$ 1,807,926
Total Active Members	977	$ 54,372,370

Table D-1 contains summaries of the data for contributing members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table D-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Terminated vested members.

Table D-3 is a reconciliation of membership data from June 30, 2021 to June 30, 2022.

The following is a summary of retired members and beneficiaries currently receiving benefits. The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 43 for an explanation of the number of annuitants used for valuation purposes.

Type of Annuitant	Number	Annual Benefits	Average Annual Benefits
Service Retirement	393	$ 9,718,438	$ 24,729
Survivors of Deceased Retired Members	19	448,519	23,606
Survivors of Deceased Active Members	12	158,878	13,240
Total Retirees and Beneficiaries	424	$ 10,325,835	$ 24,353
Disability Retirement	21	480,553	22,883
Total Annuitants	445	$ 10,806,388	$ 24,284

Terminated Members with Contributions Not Withdrawn	Number
Vested Terminated Members	169
Non-Vested Terminated Members	588
Total Terminated Members	757

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Number of Employees

Age						Completed Years of Service							
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	18	13	10	6									47
25 to 29	13	26	13	34	28								114
30 to 34	12	13	17	27	31	13	2						115
35 to 39	4	8	5	20	38	24	12						111
40 to 44	8	5	10	14	33	28	25	9					132
45 to 49	7	2	7	10	26	22	24	18	3				119
50 to 54	3	7	4	15	10	12	27	12	8	1			99
55 to 59	2	2	1	10	15	19	11	12	2		1		75
60 to 64	2	4	2	9	5	11	9	8	1	4			55
65 to 69	1			2	1	2	4		1				11
70 and up					1	1	1						3
Totals	70	80	69	147	188	132	115	59	15	5	1	-	881

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Annual Salaries in Thousands

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	878	590	475	305									2,248
25 to 29	650	1,231	611	1,827	1,743								6,062
30 to 34	566	616	838	1,451	1,905	759	130						6,265
35 to 39	227	388	256	1,081	2,210	1,543	820						6,524
40 to 44	455	241	576	715	1,904	1,820	1,743	616					8,068
45 to 49	330	122	340	644	1,523	1,434	1,796	1,280	304				7,774
50 to 54	177	291	249	910	597	754	1,833	862	668	82			6,425
55 to 59	66	149	63	642	949	1,175	710	908	156		90		4,909
60 to 64	104	174	105	538	365	666	553	556	87	284			3,432
65 to 69	42			118	58	98	271		64				650
70 and up					52	87	69						208
Totals	3,495	3,802	3,513	8,231	11,306	8,336	7,925	4,223	1,278	366	90	-	52,564

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Average Annual Salary

Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
						Completed Years of Service							
<25	48,802	45,368	47,524	50,768									47,831
25 to 29	49,977	47,353	47,008	53,748	62,251								53,179
30 to 34	47,198	47,349	49,292	53,731	61,459	58,368	65,112						54,477
35 to 39	56,812	48,500	51,131	54,033	58,164	64,292	68,304						58,779
40 to 44	56,874	48,216	57,567	51,057	57,683	64,991	69,720	68,392					61,124
45 to 49	47,156	60,758	48,586	64,437	58,585	65,188	74,849	71,134	101,176				65,326
50 to 54	59,150	41,628	62,243	60,670	59,745	62,872	67,883	71,853	83,507	81,687			64,895
55 to 59	32,817	74,622	62,577	64,229	63,290	61,848	64,566	75,661	78,046		90,357		65,451
60 to 64	51,947	43,448	52,658	59,736	72,966	60,561	61,449	69,553	86,668	70,993			62,395
65 to 69	41,534			59,017	57,562	48,995	67,699		63,753				59,061
70 and up					52,034	86,598	69,109						69,247
Totals	49,934	47,519	50,907	55,990	60,141	63,151	68,915	71,568	85,206	73,132	90,357		59,665

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.

Table D-1:
Active Members Distribution of
Part-Time Employees
as of June 30, 2022

Number of Employees

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	6	1	2	1									10
25 to 29	10	2	2	4	1								19
30 to 34	9		2	1	3								15
35 to 39	13			1									14
40 to 44	7	2	1	1		1							12
45 to 49	4			1		1			1				7
50 to 54	4		1	1	2	1							9
55 to 59	3												3
60 to 64	2				2								4
65 to 69	1						1						2
70 and up	1												1
Totals	60	5	8	10	8	3	1	-	1	-	-	-	96

Table D-2:
Distribution of Inactive Lives

The charts reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 43 for an explanation of the number of annuitants used for valuation purposes.

Members Receiving Service Retirement Benefits as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	$ -	$ -
50 to 54	28	938,994	33,535
55 to 59	76	1,983,243	26,095
60 to 64	86	2,069,982	24,070
65 to 69	92	2,282,964	24,815
70 to 74	64	1,195,996	18,687
75 to 79	25	597,348	23,894
80 to 84	14	351,074	25,077
85 to 89	6	241,065	40,177
90 and up	2	57,772	28,886
Totals	393	$ 9,718,438	$ 24,729

Members Receiving Disability Retirement Benefits as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	3	$ 59,335	$ 19,778
50 to 54	1	27,146	27,146
55 to 59	2	30,880	15,440
60 to 64	4	79,925	19,981
65 to 69	3	71,007	23,669
70 to 74	4	105,578	26,395
75 to 79	2	51,541	25,771
80 to 84	-	-	-
85 to 89	2	55,141	27,570
90 and up	-	-	-
Totals	21	$ 480,553	$ 22,883

Table D-2:
Distribution of Inactive Lives

The charts reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 43 for an explanation of the number of annuitants used for valuation purposes.

Survivors of Deceased Retired Members as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	1	$ 6,399	$ 6,399
50 to 54	-	-	-
55 to 59	-	-	-
60 to 64	1	10,525	10,525
65 to 69	4	75,479	18,870
70 to 74	1	18,452	18,452
75 to 79	1	17,205	17,205
80 to 84	3	102,127	34,042
85 to 89	4	119,037	29,759
90 and up	4	99,295	24,824
Totals	19	$ 448,519	$ 23,606

Survivors of Deceased Active Members as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	5	$ 67,901	$ 13,580
50 to 54	-	-	-
55 to 59	1	4,067	4,067
60 to 64	1	32,507	32,507
65 to 69	1	18,325	18,325
70 to 74	2	16,532	8,266
75 to 79	2	19,546	9,773
80 to 84	-	-	-
85 to 89	-	-	-
90 and up	-	-	-
Totals	12	$ 158,878	$ 13,240

Table D-2:
Distribution of Inactive Lives

The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 43 for an explanation of the number of annuitants used for valuation purposes.

Terminated Vested Members as of June 30, 2022
Number of Persons

Age	Number
<25	
25 to 29	3
30 to 34	17
35 to 39	27
40 to 44	26
45 to 49	33
50 to 54	46
55 to 59	10
60 to 64	5
65 to 69	2
70 and above	
Total	169

Table D-3:
Data Reconciliation

The following table shows a reconciliation of the participants used in the previous valuation to this valuation. This chart reflects the counts used for valuation purposes as a result of data processing.

	Active Members	Terminated Vested Members	Service Retired Members	Disabled Members	Survivors and Beneficiaries
June 30, 2021 Valuation	1,023	148	369	21	30
Refunds and Non-Vested Terminations	(115)	(4)			
Vested Terminations	(33)	33			
Service Retirements	(26)	(5)	31		
Disability Retirements	(1)			1	
Deaths	(1)			(1)	1
New Entrants	122				1
Rehires	10	(3)	(1)		
Other	(2)		(6)		(1)
June 30, 2022 Valuation	977	169	393	21	31

Comparative Schedules

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table E-1 shows a summary of the active members covered as of the various valuation dates.

Table E-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table E-3 summarizes the contribution rates determined by each annual actuarial valuation.

Table E-1:
Active Membership Data

Valuation Date June 30,	Actives	Annual Salaries in Thousands	Average Annual Salary	Average Age	Average Years of Service	Average Hire Age
2022	977	54,287	55,565	42.1	8.5	33.6
2021	1,023	60,023	58,673	41.4	8.1	33.3
2020	1,033	53,825	52,106	41.4	7.9	33.4
2019	1,021	51,677	50,614	41.7	8.0	33.8
2018	1,010	50,823	50,320	42.0	8.1	34.0
2017	1,012	49,381	48,795	42.0	8.1	33.9
2016	989	47,108	47,632	40.2	7.9	32.3
2015	993	44,713	45,029	42.2	7.6	34.6
2014	955	40,458	42,365			
2013	971	39,155	40,324			
2012	972	38,317	39,421			

Table E-2:
Members in Receipt of Annuities and Inactive Membership Data

		All Annuitants					Terminated Members	
Valuation Date June 30,	Number	Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age at Retirement	Average Service at Retirement	Number Vested Terminated	Number Non-Vested Terminated
2022	445	10,806	24,284	65.1	57.7	19.0	169	588
2021	420	9,920	23,618	64.8	57.8	18.9	148	523
2020	384	8,615	22,434	64.7	57.8	18.8	135	494
2019	346	7,624	22,034	64.4	57.7	18.5	138	447
2018	312	6,792	21,768	66.0	56.4	17.0	123	381
2017	276	5,958	21,586	66.3	56.3	17.8	114	304
2016	250	5,286	21,144	66.3	57.8	18.3	105	278
2015	231	4,721	20,437	66.3	56.4	18.5	95	235
2014	203	4,106	20,227				87	175
2013	180	3,606	20,033				69	148
2012	163	3,317	20,350				64	146

Table E-3:
Contribution Rates

Valuation Date June 30,	Contribution Rates			Normal Cost Rate*	UAAL Rate**
	Employee	Employer/State	Total		
2022	9.00 %	10.56 %	19.56 %	18.50 %	1.06 %
2021	9.00	10.56	19.56	15.70	3.86
2020	9.00	10.56	19.56	15.61	3.95
2019	9.00	10.56	19.56	16.16	3.40
2018	9.00	10.56	19.56	16.32	3.24
2017	9.00	10.56	19.56	16.19	3.37
2016	9.00	10.56	19.56	18.23	1.33
2015	9.00	10.56	19.56	18.41	1.15
2014	9.00	10.56	19.56	18.58	0.98
2013	9.00	10.56	19.56	18.82	0.74
2012	9.00	10.56	19.56	18.98	0.58

* Includes administrative expenses for the 2014 through 2021 Valuation Dates.

** The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.

Appendix F: Financial Statement Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuation as of June 30, 2022. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2022
Actuarial cost method	Entry Age Normal
Amortization method	Open
Remaining amortization period	30 Years
Asset valuation method	Four-year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.30%
General wage growth*	3.50%
Merit salary increases	1.0% - 6.4%
*Includes inflation	2.75%

Gain and Loss in Accrued Liability During Years Ended June 30 Resulting from Differences Between Assumed Experience and Actual Experience						
	Gain or (Loss) for Year Ending June 30, (expressed in thousands)					
Type of Activity	2017	2018	2019	2020	2021	2022
Investment Income on Actuarial Value of Assets	$ 645	$ (1,127)	$ (710)	$ (1,369)	$ 7,011	$ 1,031
Combined Liability Experience	(5,352)	4,375	1,891	(2,638)	(8,280)	10,036
(Loss)/Gain During Year from Financial Experience	$ (4,707)	$ 3,248	$ 1,181	$ (4,007)	$ (1,269)	$ 11,067
Non-Recurring Items	(5,308)	0	0	0	0	(20,907)
Composite Gain or (Loss) During Year	$ (10,015)	$ 3,248	$ 1,181	$ (4,007)	$ (1,269)	$ (9,840)

Schedule of Funding Progress (expressed in thousands)						
Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2022	$ 266,067	$ 320,475	83%	$ 54,408	$ 54,287	100%
2021	247,392	290,856	85%	43,464	60,023	72%
2020	221,949	264,745	84%	42,796	53,825	80%
2019	206,504	245,130	84%	38,626	51,677	75%
2018	190,849	230,077	83%	39,228	50,823	77%
2017	176,311	217,642	81%	41,332	49,381	84%

Solvency Test
Aggregate Accrued Liabilities for
(expressed in thousands)

Valuation Date June 30,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liability Covered by Reported Assets (1)	(2)	(3)
2022	$ 45,643	$ 148,131	$ 126,701	$ 266,067	100%	100%	57%
2021	44,689	131,732	114,435	247,392	100%	100%	62%
2020	43,619	113,801	107,325	221,949	100%	100%	60%
2019	41,429	100,024	103,677	206,504	100%	100%	63%
2018	39,605	88,621	101,851	190,849	100%	100%	61%
2017	39,205	77,897	100,540	176,311	100%	100%	59%

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Game Wardens' and Peace Officers' Retirement System. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gain (Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Entry Age Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

Market Value of Assets

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.